

**DEPARTMENT OF ENVIRONMENTAL QUALITY  
PERMITTING and COMPLIANCE DIVISION  
MONTANA POLLUTANT DISCHARGE ELIMINATION SYSTEM  
(MPDES)**

**Statement of Basis**

Permittee:	City of Helena
Permit No.:	MT0000949
Receiving Water:	Prickly Pear Creek
Facility Information:	
Name	Missouri River Water Treatment Plant
Location	2560 Canyon Ferry Road
Facility Contact:	John Schwartz, Water Supervisor 1115 Rimini Road Helena, MT 59601 406-447-1520
Fee Information:	
Number of Outfalls	1 - (for fee determination)
Outfall – Type	001A & 001B – Treated backwash water from the north and south infiltration/percolation basins to Prickly Pear Creek.

## I. Permit Status

The MPDES permit for the City of Helena, Missouri River Water Treatment Plant (MRWTP) was issued on November 1, 1991 and expired on September 30, 1996. The facility submitted a Short Form 2A application to renew the permit on December 11, 1995. An updated process flow diagram and additional 2A application was requested by the Department on October 30, 2002, and received by the Department on April 4, 2003.

## II. Facility Information

### A. Facility Description

The MRWTP is a conventional potable water treatment plant utilizing settling, flocculation, and filtration to process raw surface water from the Helena Valley Equalizing Reservoir into finished drinking water. The facility has a design flow rate of approximately 12 million gallons per day (mgd) of finished potable water. The MRWTP is currently operated as a peaking plant on a seasonal basis (May through October); and is shut down during the winter.

The facility uses the following chemicals to process the raw water: sodium permanganate to control organics at the draw off point at the reservoir, aluminum sulfate (alum) is utilized as the main coagulant for the facility, and the facility also uses a cationic polymer as a coagulation aid. Chlorine gas is currently used for disinfection, (personal communication with John Schwartz on May 30, 2007). The facility is currently undergoing an upgrade to convert to sodium hypochlorite liquid as the disinfecting agent.

Due to the manual operations of the facility, the filters are backwashed daily. Each of the seven filters is backwashed with chlorinated potable water for four minutes each day. The backwash process uses 4,500 gallons per minute (gpm) or 18,000 gallons for each filter; producing 126,000 gallons of backwash water daily. Backwash water is discharged into two, parallel 0.8 acre infiltration/percolation basins. Settled backwash water is discharge from the outlet structures of the basins into Prickly Pear Creek or percolates into groundwater.

Based on discharge monitoring reports (DMRs), period of record 1998 through 2006, the facility has not had a surface discharged to Prickly Pear Creek. Information brought forth during a compliance inspection conducted on October 30, 2002 confirmed this condition. The supervisor at the time (Jack Williams) stated the backwash effluent infiltrates into the shallow alluvium beneath the lagoons.

Review of the design plans and specifications (Morrison-Maierle, 1982), the lagoons were designed as infiltration/percolation (I/P) beds; as such the beds are not lined, nor do they have an under-drain collection system. Without any control systems in place, infiltration will report to the alluvial aquifer. Neither the current permit, nor the application on file identifies a ground water outfall from the facility. Without a ground water outfall designation, discharges to ground water constitute a non-permitted activity. A compliance schedule will be inserted into the permit to reconcile this condition. See Part VIII of this Statement of Basis (SOB) for details.

B. Effluent Characteristics

No effluent samples have been collected during the last five years to characterize the effluent from this facility.

C. Compliance History

An inspection of the facility on October 20, 2002 indicated compliance with permit conditions. At the time the facility was in winter shutdown mode; and was not discharging. No other violations have been noted in the facility file.

III. Rationale for Proposed Technology-Based Effluent Limits

A. Scope and Authority

The Montana Board of Environmental Review (BER) has adopted performance standards for point source discharges to state waters, under Title 17, Chapter 30, Subchapter 12 (Administrative Rules of Montana, ARM). The Board has adopted by reference 40 CFR Subpart N which is a series of federal agency rules that adopt technology based effluent limits (TBEL) for existing sources and performance standards for new sources, ARM 17.30.1207(1). National Effluent Limit Guidelines (ELG) have not been promulgated under Subchapter N for filter backwash water at potable water treatment plants.

In addition to Subchapter 12, the BER has adopted general treatment requirements that establish the degree of wastewater treatment required to maintain and restore the quality of state surface waters. This rule states that in addition to federal ELGs, the degree of wastewater treatment is based on the surface water quality standards; the state's nondegradation policy; the quality and flow of the receiving water; the quantity and quality of sewage, industrial wastes and other wastes to be treated; and the presence or absence of other sources of pollution on the watershed [ARM 17.30.635(1)]. Also, ARM 17.30.635(3) states industrial waste must receive, as a minimum, treatment equivalent to the best practicable control technology currently available (BPCTCA) as defined in 40 CFR Chapter 1, Subchapter N (July 1, 1991).

In the absence of federal effluent limitation guidelines the Department will maintain the TBEL in the previous permit and presented in Table 1.

Table 1, Proposed TBEL, Missouri River Water Treatment Plant			
Parameter	Units	Effluent Limitations	
		30-day average	Daily maximum
Total Suspended Solids (TSS)	mg/L	30	45
Total Dissolved Aluminum	mg/L	1.0	1.5
Total residual Chlorine (TRC)	mg/L	NA	0.019
pH	s.u.	Within the range of 6.5 to 9.5	

#### B. Nondegradation Load Allocations

The provisions of ARM 17.30.701, *et seq.* (Nondegradation of Water Quality) apply to new or increased sources of pollution [ARM 17.30.702(18)]. Sources that are in compliance with the conditions of their permit and do not exceed the limits established in the permit, or as determined from a permit previously issued by the Department, are not considered new or increased sources. In the previous SOB, the Department calculated mass-based load values (Table 2) for TSS and Dissolved Aluminum (Nondegradation Threshold Values, April 25, 1995) based on a design flow of 0.24 mgd. Based on this analysis, the discharge does not constitute a new or increased source for the purposes of Montana Nondegradation requirements.

Table 2. Comparison of Actual and Allocated Loads						
Parameter	Allocated Load (lbs/day)	Actual Load (lbs/day)				
		2000	2001	2002	2003	2004
TSS	7.2	0	0	0	0	0
Dissolved Aluminum	0.24	0	0	0	0	0

#### IV. Rationale for Proposed Water-Quality Based Effluent Limits (WQBEL)

##### A. Scope and Authority

Permits are required to include WQBELs when TBELs are not adequate to protect state water quality standards (40 CFR 122.44 and ARM 17.30.1344). ARM 17.30.637(2) states that no wastes may be discharged that can reasonably be expected to violate any state water quality standard. Montana water quality standards (ARM 17.30.601 *et seq.*) define both water use classifications for all state waters and numeric and narrative standards that protect those designated uses. New sources, as defined in ARM 17.30.703(16), are subject to Montana Nondegradation Policy [75-5-303, Montana Code Annotated (MCA)] and regulations (ARM 17.30.701, *et. seq.*).

## B. Receiving Water

Wastewater that is discharged to surface waters from the MRWTP will be to Prickly Pear Creek. The receiving water is classified as “I” according to Montana Water Use Classifications, ARM 17.30.610(1)(a)(ix). The goal of waters listed as “I” is to have these waters fully support their beneficial uses. ARM 17.30.628 (1) lists the following uses for “I” class waters: drinking, culinary and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and propagation of fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply. Due to the impairment states of the receiving water, it is not considered high quality water pursuant to Montana’s Nondegradation Policy,[75-5-303(3), MCA].

Prickly Pear Creek at the location of the discharge is within the upper Missouri River basin as identified on USGS Hydrological Unit Code (HUC) 10030101 and Montana stream segment MT41I006-030. Prickly Pear Creek in the vicinity of the discharge is on the 1996 303(d) list of impaired streams as not supporting: agriculture, aquatic life support, cold water fisheries-trout, drinking water supply, recreation and being swimmable. The probable causes of impairment are: flow alteration, metals, nutrients, other habitat alterations, siltation, suspended solids, and un-ionized ammonia. Prickly Pear Creek is on the 2006 303(d) list of impaired streams as not supporting aquatic life, cold water fishery, drinking water and warm water fisheries. Prickly Pear Creek partially supports agriculture, industrial water supplies and primary contact recreation. The probable causes are listed as: alteration of vegetative cover, ammonia (un-ionized), arsenic, cadmium, copper, lead, low flow alterations, nitrate + nitrite, physical substrate alterations, sedimentation/ siltation, temperature and zinc.

On August 31 2006 the EPA in conjunction with the Department issued a final report titled: *“Framework Water Quality Restoration Plan and Total Maximum Daily Loads (TMDLs) for the Lake Helena Watershed Planning Area, Volume II- Final Report”*, (Final Report). This report qualified and quantified pollutant loads in the watershed and calculated wasteload allocations (WLA) for major contributors in the watershed. The MRWTP was not identified within this report and no WLA were calculated for the facility. As the goal of the TMDL is to restore the function and use of waters within the watershed, the ultimate water use classification “B1” will be used to calculate discharges from the facility.

Critical low flow in Prickly Pear Creek at the point of discharge will be assumed to be zero. This assumption is based upon the Final Report (pp A-96) which states: “Segment 4 (MT41I006-030) is totally dewatered, but flow gains from groundwater discharge occur near the end of the reach. Therefore, flows between segments 3, 4, and 5 are not hydrologically connected.”. The discharge from the MRWTP reaches Prickly Pear Creek within segment 4.

## C. Applicable Water Quality Standards

### Surface Water

Discharges to surface waters classified B-1 are subject to the specific water quality standards of ARM 17.30.623 (March 31, 2006), Department Circular DEQ-7 (February 2006), as well as the general provision of ARM 17.30.635 through 637.

ARM 17.30.635(4) requires that the design condition for disposal systems must be based on the 7-day average flow of the receiving water which is expected to occur on average once in 10-years (7Q10).

#### D. Mixing Zone

The current MRWTP discharge permit did not grant a mixing zone within Prickly Pear Creek; nor did the permittee request a mixing zone in this permit renewal. Therefore, no mixing zone will be granted in the draft permit.

#### E. Basis and Calculations for WQBEL (Reasonable Potential)

Pollutants typically present at potable water treatment plants that may cause or contribute to a violation of water quality standards include conventional pollutants such as TSS and pH, non-conventional pollutants such as turbidity, and toxics such as chlorine and aluminum.

Effluent limits are required for all pollutants which demonstrate a reasonable potential to exceed numeric or narrative standards. The Department uses a mass balance equation to determine reasonable potential based on *EPA Technical Support Document for Water Quality based Toxics Control (TSD)*, (EPA/505/2-90-001). Input parameters are based on receiving water concentration; maximum projected effluent concentration and design flow of the wastewater treatment facility, and the applicable receiving water flow.

No information or data is available for Prickly Pear Creek immediately upstream from the facility. Therefore, reasonable potential to exceed numeric standards cannot be assessed for this permit. However, to protect the existing and anticipated beneficial uses of surface water the following evaluation will be made.

##### a. Conventional Pollutants

Total Suspended Solids - The facility provides a significant reduction for TSS through the use of coagulation/flocculation chemicals; these waste streams report to the settling ponds. TBELs in Part III of this SOB are sufficient to reduce the suspended solids and will apply to the discharge from the lagoons. No additional WQBEL will be required for this parameter.

##### b. Non-conventional Pollutants

Turbidity - There is no turbidity limit in the current permit. The maximum increase above naturally occurring turbidity in this permit is 5 nephelometric turbidity units (NTU) [ARM 17.30.624(2)(d)]. TSS limits are not adequate to control turbidity; effluent limits and monitoring will be required.

c. Toxic Pollutants

Total Residual Chlorine (TRC) - The TRC limit in the current permit is 0.019 mg/L for any grab sample. This concentration meets the acute water quality standard of 0.019 mg/L. The TRC daily maximum limit in this draft permit will be 0.019 mg/L. Analytical methods in 40 CFR Part 136 requires chlorine samples to be analyzed immediately. On-site sampling for total residual chlorine with a chlorine meter using an approved method is required. The method must achieve a minimum detection level of 0.1 mg/L. Sampling of effluent discharging from the lagoons, with analytical results less than 0.1 mg/L is considered in compliance with the chlorine limit.

Dissolved Aluminum (Al) - The maximum dissolved aluminum concentration in the current permit exceeds the acute and chronic water quality standard for aluminum. The previous dissolved aluminum effluent limits were 1.0 and 1.5 mg/L for the 30-day and daily maximum limits, respectively.

Dissolved aluminum is a toxic parameter for aquatic life (DEQ-7, February 2006) and limits are applicable to surface waters with a pH between 6.5 and 9.0 s.u. The acute standard is 0.750 mg/L and the chronic standard is 0.087 mg/L. These water quality standards will be the effluent limits applicable to the sample obtained from the settling pond at the discharge point.

Arsenic (As)- Both the water supply for the treatment plant (Canyon Ferry Reservoir) and the receiving water (Prickly Pear Creek) are 303(d) listed as impaired due to the presence of arsenic. The facility uses an oxidizer to aid in the precipitation of arsenic into the sediment and filter backwash solids from the facility. These two process streams report to the infiltration/percolation basins. With the potential of elevated levels of arsenic and the possibility of dissolution, this pollutant may report to ground water or may be entrained with sediment and discharged into the surface water. DEQ-7 establishes surface water maximum contaminant level for arsenic at 10 µg/L.

V. Proposed Effluent Limits

A. Outfall 001A and 001B

Effluent limits for Outfalls 001A and 001B are presented in Table 3, becoming effective on the effective date of the permit. These limits are applicable at the overflow point from the treatment lagoons, prior to reaching Prickly Pear Creek.

<b>Table 3. Final Effluent Limits – Outfall 001A and 001B</b>			
<b>Parameter</b>	<b>Units</b>	<b>Average Monthly Limit<sup>1</sup></b>	<b>Maximum Daily Limit<sup>1</sup></b>
Dissolved Aluminum	mg/L	0.087	0.750
	lbs/day	0.24	--
Total Suspended Solids (TSS)	mg/L	30	45
	lbs/day	7.2	--
Arsenic, Total Recoverable	mg/L	--	0.010
Total Residual Chlorine <sup>2</sup>	mg/L	--	0.019
Net Turbidity Change	ntu	--	5 <sup>3</sup>
Footnotes: NA – Not applicable 1. See Definition section at end of permit for explanation of terms. 2. Sampling of effluent with analytical results less than 0.1 mg/L is considered in compliance with the chlorine limit. 3. The maximum allowable increase above naturally occurring turbidity, as measured by (discharge ntu – upstream ntu = net turbidity change).			

Effluent pH shall remain between 6.0 and 9.0. For compliance purposes, any single analysis and/or measurement beyond this limitation shall be considered a violation of the conditions of this permit [ARM 17.30 647(2)(c)].

There shall be no discharge of floating solids or visible foam in other than trace amounts [ARM 17.30 647(1)(b)].

There shall be no discharge which causes visible oil sheen in the receiving water [ARM 17.30 647(1)(b)].

There shall be no acute toxicity in the effluent discharged by the facility.

## VI. Monitoring Requirements

### A. Effluent Monitoring

Monitoring of the effluent must be representative of the discharge. Unless otherwise specified, effluent samples must be obtained from the outlet structures from the infiltration/percolation basins prior to reaching Prickly Pear Creek. See Figure 1 for the orientation of the outfalls from the facility. The permittee is required to sample each outfall independently should they discharge.



Table 4. Surface Water Monitoring Requirements				
Parameter	Unit	Monitoring Location	Frequency of Analyses	Sample Type <sup>1</sup>
Flow <sup>2</sup>	mgd	Effluent	Continuous	Recorder
Flow <sup>3</sup>	mgd	Effluent	5/Week	Instantaneous
TSS	mg/L	Effluent	5/Week	Grab
	lbs/day	Effluent	1/Month	Calculated
Dissolved Aluminum	mg/L	Effluent	1/Week	Grab
	lbs/day	Effluent	1/Month	Calculated
pH	s.u.	Effluent	Daily	Instantaneous
Total Residual Chlorine	mg/L	Effluent	Daily	Grab
Turbidity	ntu	Effluent	Daily	Grab
		Receiving Water	Daily	Grab
Footnotes:				
1. See Definition section at end of permit for explanation of terms.				
2. Daily flows discharged to the infiltration basins.				
3. Daily flows discharged from the infiltration basins to Prickly Pear Creek.				

### C. Additional Reporting Requirements

Load calculations are required. Standard language with examples of load calculations and percent removal calculations will be included in the permit.

Analytical methods in 40 CFR Part 136 requires TRC samples to be analyzed immediately. On-site sampling for TRC with a chlorine meter using an approved method is required. The method must achieve a minimum detection level of 0.1 mg/L. Effluent samples with analytical results less than 0.1 mg/L is considered in compliance with the TRC limit.

### VII. Nonsignificance Determination

As discussed in the previous sections, the proposed effluent limits and discharge flows for the MRWTP permit do not constitute a new or increased source of pollutants pursuant to ARM 17.30.702(16). Therefore, a nonsignificance analysis is not required [ARM 17.30.705(1)].

### VIII. Special Conditions/Compliance Schedules

ARM 17.30.1342 requires that the permittee furnish to the Department, within a reasonable time, information which the Department may request to determine compliance with this permit.

**Ground Water Discharge:** Montana's ground water regulations require that any owner or operator of any existing source discharging pollutants into state ground waters shall file a permit

application within one year of October 29, 1982, (ARM 17.30.1023(1). ARM 17.30.1002(14) defines a "Source" as any sewage system, treatment works, point source, disposal system, concentration of pollutants, or pond containing process wastes or pollutants used, or employed, or operated so that the same results or under normal operating conditions may reasonably be expected to result in the discharge of pollutants to ground waters of the state.

As the treatment works have been designed as infiltration/percolation beds, a discharge to ground water is expected. Based on this information, the permittee shall eliminate discharges to ground water or submit application for permit coverage for the effluent discharging from the infiltration/percolation beds to ground water.

- i) Authority: 75-5-605(1) and (2) MCA, states that it is unlawful to cause pollution of state waters or construct and operate disposal systems, or discharge waste into state waters without a current permit from the Department. As ground water is defined as state waters [75-5-103(29) MCA] discharging to ground water is in violation to the act.
- ii) Schedule: By {DATE} (or one year from the effective date of the permit) the permittee shall submit a copy of the proposed plan and schedule, either to eliminate ground water discharges from the infiltration/percolation beds, or submit application for permit coverage for a ground water discharge. Should the permittee choose to eliminate the discharge to ground water, final completion and commissioning of the project shall be by {DATE} (or five years from the effective date of the permit).

The permittee will be required to submit semi-annual reports (August 28 and January 28) annually, showing progress towards completion of the aforementioned milestones, and the viability of meeting final compliance dates.

In accordance with ARM 17.30.1342(11), all reports, plans or information submitted to the Department must be signed and certified in accordance with Part IV.G of the permit and ARM 17.30.1323. Legible copies of these reports shall be submitted to the Department at the following address:

Montana Department of Environmental Quality  
Compliance Section Supervisor  
Water Protection Bureau  
PO Box 200901  
Helena, MT 59620-0901  
Phone (406) 444-3080

#### IX. Other Information

On September 21, 2000, a U.S. District Judge issued an order stating that until all necessary total maximum daily loads (TMDLs) under Section 303(d) of the Clean Water Act are established for a particular water quality limited segment (WQLS), the State is not to issue any new or increased permits under the MPDES program. The order was issued in the

lawsuit Friends of the Wild Swan v. U.S. EPA, et al. (CV 97-35-M-DWM), District of Montana and Missoula Division. The DEQ finds that renewal of this permit does not conflict with the order because there are no new or increased sources associated with the discharge.

X. Information Source

Montana Water Quality Act 75-5-101 *et. seq.*

ARM Title 17, Chapter 30, Subchapter 5 - Mixing Zones in Surface and Ground Water. November 2004.

ARM Title 17, Chapter 30, Subchapter 6 - Surface Water Quality Standards. March 31, 2006.

ARM Title 17, Chapter 30, Subchapter 7 - Nondegradation of Water Quality. June 30, 2004.

ARM Title 17, Chapter 30, Subchapter 13 - Montana Pollutant Discharge Elimination System (MPDES) Standards. March 31, 2003.

40 CFR, Parts 122, 133, 136, July 1, 2004.

DEQ. Circular WQB-7, Montana Numeric Water Quality Standards. February 2006.

DEQ. Montana List of Water bodies in Need of Total Maximum Daily Load Development. 1996.

DEQ. Montana 303(d) List. A Compilation of Impaired and Threatened Water bodies in Need of Water Quality Restoration. Part A. Water Quality Assessment Results. November 24, 2006.

EPA. Office of Water, U.S. EPA NPDES Permit Writers' Manual, EPA-833-B-96-003. December 1996.

EPA. Technical Support Document for Water Quality based Toxics Control EPA/505/2-90-001. March 1991.

EPA. Framework Water Quality Restoration Plan and Total Maximum Daily Load (TMDLs) for the Lake Helena Watershed Planning Area, Volume II- Final Report. August 2006

Missouri River Water Treatment Plant, Facility Plans, Morrison-Maierle 1982

Prepared by: James Lloyd  
Date: July 2007

Figure 1, Orientation of the MRWTP Discharge

